DIVIDEND FROM RESEARCH

CONNECTICUT RIVER SHAD FISHERY

Charles H. Walburg
Bureau of Commercial Fisheries
Beaufort, North Carolina

In 1950 the U. S. Fish and Wildlife Service, at the request of the Atlantic States Marine Fisheries Commission, began an investigation of the Atlantic coast shad fishery. The purpose of this investigation was to (1) determine causes for decline in the fishery, (2) determine conditions favoring recovery of runs, and (3) provide basic information for scientific management of the fishery to obtain maximum yields.

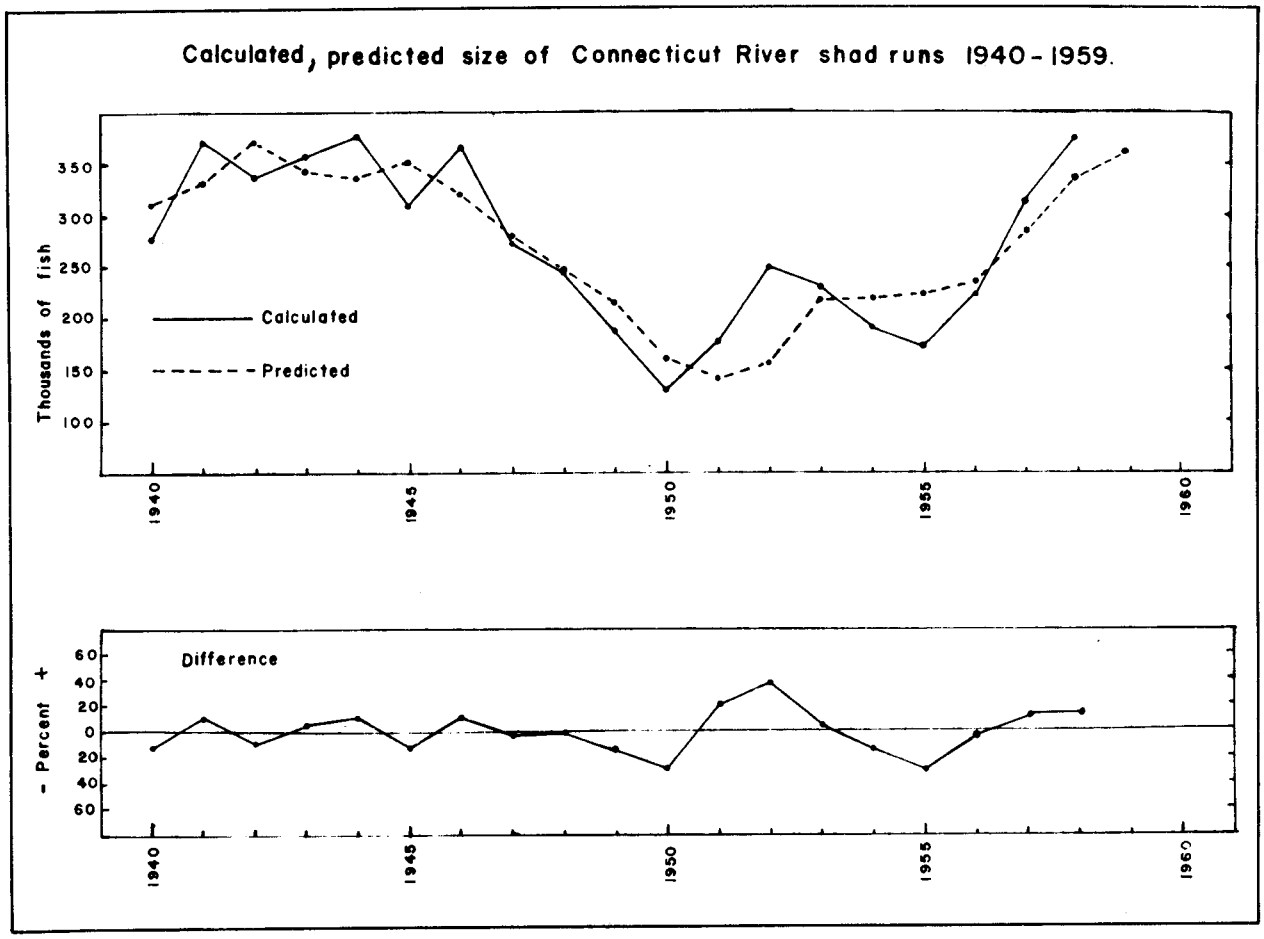
Investigation of the Connecticut River shad fishery was begun in 1951. The total population of shad (Alosa sapidissima) entering the river was enumerated by the tagging method. Catch and effort data, collected by the Connecticut State Board of Fisheries and Game, were available for each year since 1935. Size of run, total catch, and fishing effort were determined for 1951; therefore, it was possible to back-calculate and determine the size of run and spawning escapement for each year for which catch and effort data were available.

By aging scales obtained from samples of the commercial catch, it was found that the majority of the shad return to the river to spawn at 4 and 5 years of age, and that shad which have spawned in the previous year (repeaters) also make up a large segment of the catch. As the progeny of fish that had spawned 4 or 5 years previously and adult fish that had spawned the previous year made up the bulk of the population in any 1 year, it was hypothesized that the number of fish that escaped the fishery to spawn 5, 4, and 1 year previous might be correlated with size of run. To test this hypothesis, a multiple-regression analysis was calculated between the size of population each year and the size of the spawning escapement 5, 4, and 1 year previous. It was inferred from this analysis that, on the average, 83 percent of the annual variation in population size could be attributed to changes in the size of the spawning escapement.

Other factors in addition to spawning escapement were studied to determine their effect on fluctuations in population size. These were as follows: water temperature, stream flow, pollution, and fishing mortality occurring outside the river. None of these factors was significant in its effect on population size. However, in any 1 year the population could be affected by one or more of these factors.

As the number of shad permitted to escape the fishery and spawn is the most important factor affecting size of runs, a regression equation calculated from escapement and size-of-run data was used to predict the size of the Connecticut River shad run 1 year in advance. The predicted and calculated size of run each year from 1940 through 1959, together with the percent difference between the predicted and calculated estimates of population size, is shown in the accompanying figure.

It is now possible to manage the shad fishery of the Connecticut River in such a way as to permit adequate escapement and increase population size. From an inspection of the figure it can be seen that size of population abruptly decreased from 1946 to 1950 and then gradually increased from 1950 to 1958. Spawning



escapements influencing the runs in the former period were low, whereas those of the latter period were relatively high. In the latter period management was not necessary to achieve increased spawning escapements. Because of low catches, poor market conditions, and increased cost of operation, fishermen fished less; and thereby more fish were permitted to spawn. As a result of these increases in escapement, the shad population increased from 131,000 in 1950 to 372,000 in 1958.

Now that the Connecticut River shad population is at a high level, fishing pressure may again increase. As the size of run can be predicted 1 year in advance, fishing effort can be regulated to insure that optimum escapement is obtained each year. As a result, this fishery can now be managed to produce maximum continuing yields--a dividend of research.